

What is claimed is:

1. A stop valve comprising:

a working rod for operating a valve element which is moved to close and open a main conduit;

5 a biasing member which biases said working rod in a direction to make said valve element one of close and open said main conduit;

a piston body which is coupled to said working rod and slidably fitted in a housing of said stop valve;

10 a pressure chamber formed within said housing by said piston body;

a pressure supplying device which supplies a working fluid to said pressure chamber to move said working rod in a direction against a biasing force of said biasing

15 member; and

a visual checking member which is integral with said working rod to project from said housing in accordance with movement of said working rod, wherein an amount of projection of said visual checking member varies in  
20 accordance with an axial position of said working rod.

2. The stop valve according to claim 1, wherein said visual checking member fully retreats into said housing when said working rod is in one of a valve-open position and a valve-closed position, and

25 wherein said visual checking member projects from

said housing when said working rod is in the other of said valve-open position and said valve-closed position.

3. The stop valve according to claim 1, wherein said visual checking member is formed as a cylindrical member which is coaxial to said working rod,

wherein said working rod comprises a control conduit which is connected with said pressure chamber, and

wherein an external tube is connected to said working rod to be positioned in said visual checking member and to be connected with said control conduit.

4. The stop valve according to claim 1, further comprising a cylindrical holder which is coaxially fixed to said working rod,

wherein said visual checking member is formed as a cylindrical member, and is fixedly attached to said cylindrical holder.

5. The stop valve according to claim 4, wherein said biasing member biases said working rod in said first direction to make said valve element close said main conduit,

and wherein said stop valve further comprises a hand-operated valve opening jig which includes:

a manual-opening attachment which can be detachably attached to said cylindrical holder; and

an operational member which is operated to move said

working rod in a direction to make said valve element open said main conduit via said manual-opening attachment.

6. The stop valve according to claim 4, further comprising a hand-operated valve opening jig which  
5 includes:

a rotational member having a cylindrical surface which comes into contact with an operational mount mounted on said housing, said rotational member being pivoted about said manual-opening attachment via a pivot provided at a  
10 position which deviates from an approximate center of said cylindrical surface toward said cylindrical holder; and  
an operational member which is operated to couple said manual-opening attachment to said cylindrical holder, and is operated to rotate said rotational member with said  
15 cylindrical surface contacting said operational mount.

7. The stop valve according to claim 6, wherein said hand-operated valve opening jig comprises a locking shaft which is screwed into said rotational member so that a tip end of said locking shaft can be engaged with a stopper  
20 surface formed on said manual-opening attachment,

wherein said stopper surface is formed so that a distance between said stopper surface and said tip end of said locking shaft increases as said cylindrical holder is moved in a valve-opening direction via said manual-  
25 opening attachment and said pivot when said rotational

member is rotated with said cylindrical surface thereof remaining in contact with said operational mount, and

wherein said distance varies in accordance with an amount of screw-engagement of said locking shaft with  
5 respect to said rotational member.

8. The stop valve according to claim 7, wherein said locking shaft is formed integral with said operational member.

9. The stop valve according to claim 5, wherein  
10 said hand-operated valve opening jig comprises:

a rotational member having a cylindrical surface which comes into contact with an operational mount mounted on said housing, said rotational member being pivoted about said manual-opening attachment via a pivot provided at a  
15 position which deviates from an approximate center of said cylindrical surface toward said cylindrical holder;

a locking arm which is pivoted within said rotational member, wherein one end of said locking arm can be engaged with said stopper surface of said manual-opening  
20 attachment; and

a spring which biases said locking arm so that said one end of said locking arm is biased in a direction to be engaged with said stopper surface of said manual-opening attachment;

25 wherein said stopper surface is formed so that a

distance between said stopper surface and the pivot point of said locking arm increases as said cylindrical holder is moved in a valve-opening direction via said manual-opening attachment and said pivot when said rotational member is rotated with said cylindrical surface thereof remaining in contact with said operational mount, and

wherein a distance between said one end of said locking arm and said stopper surface increases if said locking arm is rotated manually against spring force of said spring.

10 10. The stop valve according to claim 9, wherein said operational lever is fixed to said rotational member in order to manually rotate said rotational member, said locking arm being positioned in said operational lever.

15 11. The stop valve according to claim 1, wherein said stop valve comprises a power-assisted device with which said biasing force of said biasing member is multiplied to be transmitted to said working rod.

20 12. The stop valve according to claim 1, wherein said visual checking member is colored.

13. The stop valve according to claim 1, further comprising:

a stationary bearing member which is provided in said housing, wherein said piston body and said working rod are relatively movable with respect to said stationary bearing

member;

a gap formed between said piston body and said stationary bearing member via which said working fluid is supplied to said pressure chamber;

5 at least one slit formed on said stationary bearing member to be connected with said gap so that said working fluid is supplied to said pressure chamber via said gap and said at least one slit; and

a sealing member supported by said piston body,  
10 wherein said sealing member opens one end of said gap to make said pressure chamber connect with a control conduit via said gap and said at least one slit when said piston body is positioned at a limit of a movable range thereof due to said biasing force of said biasing member, and  
15 wherein said sealing member closes said one end of said gap to make said pressure chamber connect with said control conduit via only said at least one slit when said piston body moves from said limit of said movable range,

wherein said pressure chamber is defined by said  
20 piston body, said housing and said stationary bearing member.

14. The stop valve according to claim 13, wherein said sealing member is formed as an annular sealing member which is fitted in an annular groove formed on an inner  
25 peripheral surface of said piston body to face said gap.

15. The stop valve according to claim 3, further comprising a line joint which is positioned in said visual checking member and coupled to said working rod to be connected with said control conduit, one end of said external tube being connected to said working rod via said line joint.

16. An apparatus for manually opening a normally-closed valve, said apparatus comprising said normally-closed valve and a hand-operated valve opening jig,

wherein said normally-closed valve comprises:

a working rod for operating a valve element which is moved to close and open a conduit;

a cylindrical holder which is coaxially fixed to said working rod, and to which said hand-operated valve opening jig can be detachably attached from the outside of said housing;

a biasing member which biases said working rod in a first direction to make said valve element close said conduit; and

a pressure chamber which is formed within said housing, and is supplied with a working fluid to move said working rod in a second direction to make said valve element open said conduit;

wherein said hand-operated valve opening jig

comprises:

a manual-opening attachment which can be detachably attached to said cylindrical holder;

a rotational member having a cylindrical surface  
5 which comes into contact with an operational mount mounted on said housing, said rotational member being pivoted about said manual-opening attachment via a pivot provided at a position which deviates from an approximate center of said cylindrical surface toward said cylindrical holder; and  
10 an operational member which is operated to couple said manual-opening attachment to said cylindrical holder, and is operated to rotate said rotational member with said cylindrical surface contacting said operational mount.

17. The apparatus according to claim 16, wherein  
15 said hand-operated valve opening jig comprises a locking shaft which is screwed into said rotational member so that a tip end of said locking shaft can be engaged with a stopper surface formed on said manual-opening attachment;

wherein said stopper surface is formed so that a  
20 distance between said stopper surface and said tip end of said locking shaft increases as said cylindrical holder  
51 is moved in a valve-opening direction via said manual-opening attachment and said pivot when said rotational member is rotated with said cylindrical surface  
25 thereof remaining in contact with said operational mount,



and

wherein said distance varies in accordance with an amount of screw-engagement of said locking shaft with respect to said rotational member.

5        18. The apparatus according to claim 17, wherein said locking shaft is formed integral with said operational member.

19. The apparatus according to claim 16, wherein said hand-operated valve opening jig comprises:

10        a locking arm which is pivoted within said rotational member, wherein one end of said locking arm can be engaged with said stopper surface of said manual-opening attachment; and

15        a spring which biases said locking arm so that said one end of said locking arm is biased in a direction to be engaged with said stopper surface of said manual-opening attachment,

wherein said stopper surface is formed so that a distance between said stopper surface and the pivot point of said locking arm increases as said cylindrical holder is moved in a valve-opening direction via said manual-opening attachment and said pivot when said rotational member is rotated with said cylindrical surface thereof remaining in contact with said operational mount, and

20

25        wherein a distance between said one end of said

locking arm and said stopper surface increases if said locking arm is rotated manually against spring force of said spring.

20. The apparatus according to claim 19, wherein  
5 said hand-operated valve opening jig further comprises an operational lever fixed to said rotational member for manually rotating said rotational member, said locking arm being positioned in said operational lever.

21. The apparatus according to claim 16, wherein  
10 said stop valve comprises a power-assisted device with which said biasing force of said biasing member is multiplied to be transmitted to said working rod.

22. A stop valve comprising:  
a working rod for operating a valve element which  
15 is moved to close and open a conduit;  
a biasing member which biases said working rod in a first direction to make said valve element close said conduit;

a pressure chamber formed within a housing of said  
20 stop valve;

a pressure supplying device which supplies a working fluid to said pressure chamber to move said working rod in a second direction against a biasing force of said biasing member; and

25 a moving member which moves together with said

working rod to project out of and retreat into said housing in accordance with movement of said working rod.

23. A stop valve comprising:

a working rod for operating a valve element which is  
5 moved to close and open a conduit; and

a moving member which moves together with said  
working rod so that said moving member retracts into a  
housing of said stop valve when said valve element is moved  
to close said conduit and so that at least part of said  
10 moving member projects out of said housing when said valve  
element is moved to open said conduit.